HVAC Systems Maintenance and Troubleshooting Guide

I. Purpose:

This document explains the maintenance, replacement, and troubleshooting of the ARCS Bard AC system. The system consists of two Bard WA242 wall-mounted air conditioners, an associated lead/lag controller, a thermostat, and an electrical circuit supply.

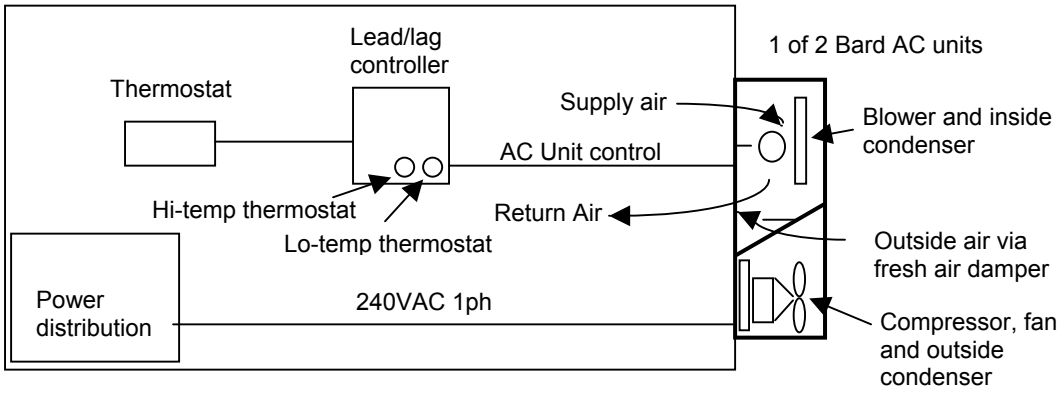
II. Overview:

The I-, D-, and E-Van environment at the Manus, Nauru, and Darwin Sites are maintained by Bard WA242 wall mount air conditioners (two for each van) with a lead/lag controller and thermostat for each van. Although these units also provide heating, it is not required at the tropical sites and thus is not covered in this document. For the U-Van, a single Bard AC unit maintains the environment, and locally purchased AC units maintain environment in storage vans.

Two Bard AC units in each van (except for the U-Van) are controlled in a primary-secondary duty configuration by the Bard MC91A lead/lag controller and associated thermostat (see Figure1). The lead/lag controller provides total redundancy and equal wear of both units. The lead/lag controller contains the following functions:

- 24-hour timer – switches primary duty for the two AC units every 24 hours. One unit becomes the primary for a 24-hour period. At the end of the 24-hour period the timer contacts switch and the primary becomes the secondary unit and vice versa.
- Power loss alarm
- High-temperature thermostat w/alarm
- Low-temperature thermostat w/alarm
- Second-stage cooling alarm

Figure 1: Component and operation diagram



The alarms are monitored by the SAM/ACCESS facilities PLC, and their readings are available on the GOES Health&Status Web pages. Typical operation is as follows:

- Normal maintenance of thermostat set point requires operation of the primary unit only.
- If van temperature is at or above the thermostat setting but below the high-temperature alarm thermostat on the lead/lag controller, the second-stage cooling alarm will sound and the secondary unit will start operating in addition to the primary.

For further information, refer to vendor-provided installation instruction, *Wall Mounted Packaged Air Conditioner Models WA182, WA242 — MAN(ARCS)-045.000.*

III. Requirements:

None.

IV. Procedure:

A. Troubleshooting Bard AC Units:

TWP Ops experience with failing AC units usually involves the refrigerant/compressor circuits. This usually requires local AC services. However, not all problems are compressor-related and require a proper diagnostic procedure. This section covers troubleshooting and inspection of electrical connections and control components.

Symptom:

One of the Unit's compressor or fan does not operate.

Diagnosis:

This is typically a compressor or refrigerant circuit problem but also could be a controller problem. If both units fail to operate, the problem is most likely the controller (possibly a relay), timer, or transformer power supply.

Troubleshooting Steps:

1. Check the breaker in DP240 (located on the main breaker panel on the right of van entrance).
2. Check breaker disconnect located outside in AC unit access panel.
3. Check for loose/damaged wiring in AC unit access panel.
4. Perform lead/lag controller checkout. This procedure bypasses the timer and forces each AC unit to be the primary.

a) Turn Hi and Lo alarm thermostats to OFF.

b) Thermostat system should be OFF. Fan switches OFF. Heating lever far left, cooling lever far right.

c) Remove wire from Timer terminal 1.

d) Set system switch to ON.

e) Move thermostat cooling lever slowly left until unit #1 comes on.

f) Continue moving lever to the left until second-stage unit #2 comes on.

g) Reset cooling lever to the right.

h) Place a jumper between timer terminal 2 and wire removed in Step C.

i) Repeat Steps a) and b) replacing phrase, “unit 1” with “unit 2”.

j) Remove jumper and reattach wire to Timer terminal 1.

5. If both AC units operate and blow cool air then the problem may lie with the lead/lag controller. Refer to next section for lead/lag controller diagnostics.

B. Troubleshooting Bard Lead/Lag Controller:

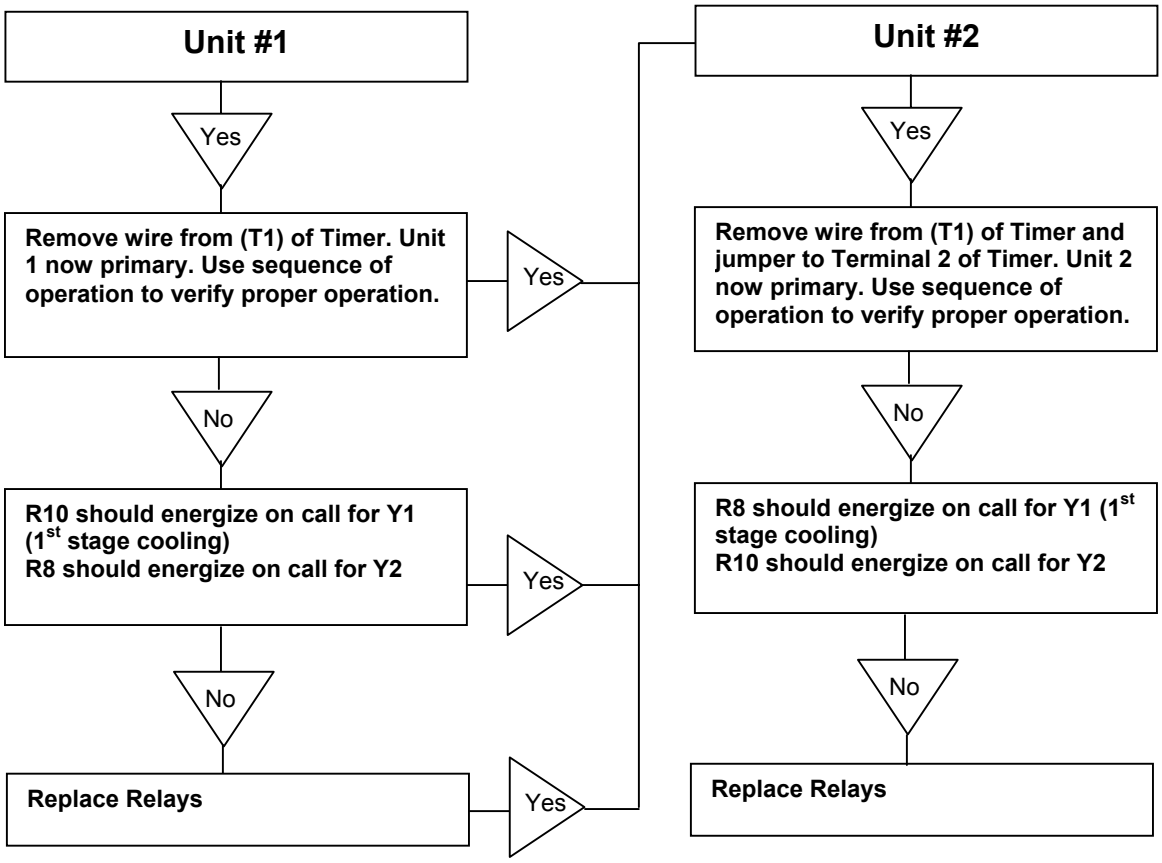
Symptom:

AC units are determined to be working in Part A but primary/secondary switching not working.

Diagnosis:

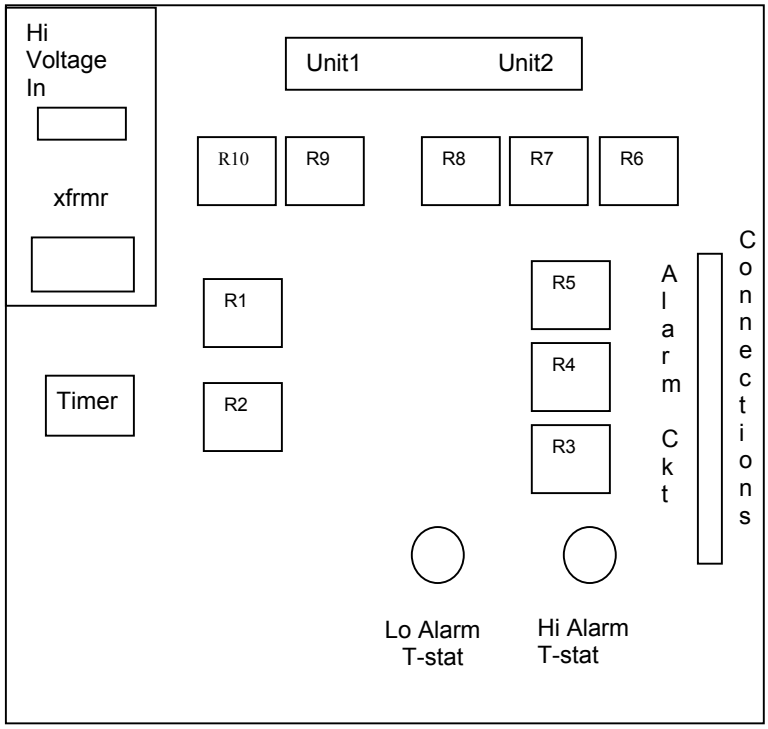
Section A can identify some controller problems. Use the following flow diagram (Figure 2) to pinpoint component failure on the controller.

Figure 2: Lead\lag controller troubleshooting flow diagram



See Figure 3 for component locations for the lead/lag controller.

Figure 3: Lead/lag controller component locations



Adjustment:

1. After any repairs are made the lead/lag controller Hi/LO alarm thermostats and wall thermostat must be reset and adjusted. Set the wall thermostat levers to desired set point. Set the lead/lag controller Lo and Hi thermostats as follows:

   a) Lo = ~10F or more than thermostat heating lever*

      ⇒ **Heating lever should be full left for TWP locations as the heating cycle is not required.**

   b) Hi = ~8F above thermostat cooling lever

2. Check the lead/lag timer by removing jumper from Timer terminals 6 and 7. You should hear relays 1 and 2 switching (speedup mode).

3. Replace jumper, and then reset thermostat system switch to “Auto.”

C. Installing New or Spare Units:

Important: New or replacement units must undergo factory recommended startup before beginning any cooling cycle. These procedures must be followed at initial startup and anytime power has been removed for 12 hours or longer.

1. Make certain Thermostat is in "Off" position.
2. Apply power by closing the system disconnect switch located in the wiring access panel on the outside of the unit. This turns on the unit compressor heater.
3. Allow 4 hours minimum warm-up time.
4. After elapsed time the thermostat may be set to operate the compressor.
5. Adjust the fresh air damper to minimum travel by locating the nylon stop pins close together. The damper housing has pre-punched holes at intervals to allow for damper travel. The fresh air damper can be accessed by removing the Return Air grating on the inside of the van.

D. Maintenance:

Every RESET:

1. Replace air filters.
2. Remove unit access panels and inspect wiring. Look for corrosion, carbon tracking, burned components.
3. Perform Step 1-6 in Section A of the Troubleshooting section. This bypasses the lead/lag 24-hour timer and allows a RESET person to observe proper operation of both units.
4. Reset the lead/lag controller Hi/LO thermostats and wall thermostat using the procedures in Adjustments section.
5. Check thermostat thermometer with hand-held T/RH probe.

Once a Month:

1. Change unit filters.

V. References:

1. Wall Mounted Packaged Air Conditioner Models WA182, WA242 — MAN(ARCS)-045.000.

VI. Attachments:

None.